

What is Claimed is:

1. An antiviral composition comprising a CCL5 polypeptide, wherein the CCL5 polypeptide inhibits infection by a virus of the Family Paramyxoviridae (paramyxovirus) in a mammalian subject.
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2. The composition of claim 1, wherein the paramyxovirus is a respiratory syncytial virus (RSV).
- 10 3. The composition of claim 2, wherein the CCL5 polypeptide inhibits RSV infection by blocking the interaction between an RSV fusion (F) protein and a mammalian epithelial cell.
4. The composition of claim 1, wherein the CCL5 polypeptide is a synthetic CCL5 polypeptide or a recombinantly expressed CCL5 polypeptide.
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5. The composition of claim 4, wherein the CCL5 polypeptide is biologically inactive as a chemokine in a mammalian subject.
- 20 6. The composition of claim 1, wherein the mammalian subject is a human.
- 7 The composition of claim 1, wherein the mammalian subject is a domesticated non-human mammal selected from the group consisting of a cow, a horse, a pig, a dog, a cat, a goat and a sheep.
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8. The composition of claim 1, wherein the CCL5 polypeptide comprises an amino acid sequence of SEQ ID NO:1.
9. The composition of claim 1, wherein the CCL5 polypeptide is an NH₂-terminus modified CCL5 polypeptide.
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10. The composition of claim 9, wherein the NH₂-terminus modified CCL5 polypeptide is selected from the group consisting of an aminooxypentane-

CCL5 (AOP-CCL5), a Met-CCL5, a N^α-nonanoyl-CCL5 (NNY-CCL5), a Δ1-2 truncated CCL5 and a Δ1-8 truncated CCL5.

- 5 11. The composition of claim 1, further comprising one or more CCL5 peptide fragments, wherein the fragments comprise about 10 to 20 contiguous amino acids of the CCL5 polypeptide of SEQ ID NO:1.
- 10 12. The composition of claim 11, wherein the one or more CCL5 peptide fragments are selected from the group consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:15, SEQ ID NO:16, SEQ ID NO:17 and SEQ ID NO:18.
- 15 13. The composition of claim 12, wherein the CCL5 peptide fragment comprises an amino acid sequence of SEQ ID NO:2.
- 20 14. The composition of claim 13, wherein the peptide fragment of SEQ ID NO:2 is further defined as an NH₂-terminal peptide of SEQ ID NO:1.
- 15 15. The composition of claim 1, wherein the CCL5 polypeptide is further defined as a human CCL5 polypeptide.
- 25 16. The composition of claim 1, further comprising a peptide mimetic of the NH₂-terminus of the CCL5 polypeptide of SEQ ID NO:1.
- 30 17. The composition of claim 16, wherein the peptide mimetic of the NH₂-terminus of the CCL5 polypeptide is a retroinverted CCL5 polypeptide comprising an amino acid sequence of SEQ ID NO:19, SEQ ID NO:20 or SEQ ID NO:21.
18. The composition of claim 1, further comprising an organic molecule which binds a CCR3 chemokine receptor.

19. The composition of claim 18, wherein the organic molecule is a CCR3 receptor antagonist.
- 5 20. The composition of claim 19, wherein the organic molecule comprises one or more chemical structures of formula I, II or III.
21. The composition of claim 1, wherein the composition is administered to a mammalian subject by intranasal administration or parenteral administration.
- 10 22. The composition of claim 1, further comprising an organic molecule which is a CCR1 antagonist or a CCR5 antagonist.
23. A recombinant expression vector comprising a polynucleotide sequence encoding the CCL5 polypeptide of claim 1.
- 15 24. A host cell transfected, transformed or infected with the vector of claim 23.
25. An antiviral composition comprising an NH₂-terminal peptide fragment of a CCL5 polypeptide, wherein the fragment comprises about 10 to 20 contiguous amino acids of the NH₂-terminus of a CCL5 polypeptide, wherein the fragment inhibits infection by a virus of the Family Paramyxoviridae (paramyxovirus) in a mammalian subject.
- 20 26. The composition of claim 25, wherein the paramyxovirus is RSV.
27. The composition of claim 25, wherein the CCL5 polypeptide comprises an amino acid sequence of SEQ ID NO:1.
- 25 28. The composition of claim 27, wherein the NH₂-terminal peptide fragment comprises an amino acid sequence selected from the group consisting of SEQ ID NO:2, SEQ ID NO:3, SEQ ID NO:4, SEQ ID NO:5, SEQ ID NO:6, SEQ ID NO:7, SEQ ID NO:8, SEQ ID NO:9, SEQ ID NO:10, SEQ ID NO:11,
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SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:14, SEQ ID NO:15, SEQ ID NO:16, SEQ ID NO:17 and SEQ ID NO:18.

- 5 29. The composition of claim 28, wherein the NH₂-terminal peptide fragment comprises an amino acid sequence of SEQ ID NO:2.
30. The composition of claim 25, wherein the composition is biologically inactive as a chemokine in a mammalian subject.
- 10 31. The composition of claim 25, wherein the composition is administered to a mammalian subject by intranasal administration or parenteral administration.
- 15 32. The composition of claim 25, wherein the NH₂-terminal CCL5 peptide fragment inhibits RSV infection by blocking the interaction between an RSV fusion (F) protein and a mammalian epithelial cell.
- 20 33. The composition of claim 25, further comprising one or more NH₂-terminus modified CCL5 polypeptides selected from the group consisting of an aminooxypentane-CCL5 (AOP-CCL5), a Met-CCL5, a N^α-nonanoyl-CCL5 (NNY-CCL5), a Δ1-2 truncated CCL5 and a Δ1-8 truncated CCL5.
34. The composition of claim 25, further comprising a peptide mimetic of the NH₂-terminus of the CCL5 polypeptide of SEQ ID NO:1.
- 25 35. The composition of claim 34, wherein the peptide mimetic of the NH₂-terminus of the CCL5 polypeptide is a retroinverted CCL5 polypeptide comprising an amino acid sequence of SEQ ID NO:19, SEQ ID NO:20 or SEQ ID NO:21.
- 30 36. The composition of claim 25, further comprising an organic molecule which is an antagonist of a CCR1 receptor, a CCR3 receptor or a CCR5 receptor.

37. A recombinant expression vector comprising a polynucleotide sequence encoding the NH₂-terminal CCL5 peptide fragment of claim 25.
38. A host cell transfected, transformed or infected with the vector of claim 37.
39. An organic small molecule mimetic which is designed by computer based molecular modeling using the atomic X, Y, Z coordinates of the first fifteen CCL5 NH₂-terminal amino acids of SEQ ID NO:1, wherein the X, Y, Z, coordinates are found in a Brookhaven Protein Data Bank file selected from the group consisting of 1RTN, 1RTO, 1EQT and 1B3A.
40. An antiviral composition comprising an organic molecule of claim 39.
41. A peptide mimetic of the NH₂-terminus of a CCL5 polypeptide, wherein the peptide mimetic inhibits infection by a virus of the Family Paramyxoviridae (paramyxovirus) in a mammalian subject.
42. The peptide mimetic of claim 41, wherein the mimetic is designed by computer based molecular modeling using the atomic X, Y, Z coordinates of the first fifteen CCL5 NH₂-terminal amino acids of SEQ ID NO:1, wherein the X, Y, Z, coordinates are comprised in a Brookhaven Protein Data Bank file selected from the group consisting of 1RTN, 1RTO, 1EQT and 1B3A.
43. The of peptide mimetic of claim 41, wherein the mimetic is a reverse turn mimetic.
44. The peptide mimetic of claim 43, wherein the reverse turn mimetic is a β -turn mimetic, a monocyclic β -turn mimetic, a bicyclic β -turn mimetic, a γ -turn mimetic or a monocyclic γ -turn mimetic.
45. An antiviral composition comprising the peptide mimetic of claim 41.

46. A method for preventing or inhibiting infection by a virus of the Family Paramyxoviridae (paramyxovirus) in a mammalian host, the method comprising administering to the host a pharmaceutically effective amount of the composition of claim 1.
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47. A method for preventing or inhibiting paramyxovirus infection in a mammalian host, the method comprising administering to the host a pharmaceutically effective amount of the composition of claim 25.
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48. A method for preventing or inhibiting paramyxovirus infection in a mammalian host, the method comprising administering to the host a pharmaceutically effective amount of the composition of claim 39.
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49. A method for preventing or inhibiting infection by a virus of the Family Paramyxoviridae (paramyxovirus) in a mammalian host, the method comprising administering to the host a pharmaceutically effective amount of the composition of claim 41.